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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/905,043	07/13/2001	Aseem Kumar Srivastava	01-SM5-216	2232

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EXAMINER
HASSANZADEH, PARVIZ

ART UNIT	PAPER NUMBER
1763	6

DATE MAILED: 03/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/905,043	SRIVASTAVA ET AL.	
	Examin r	Art Unit	
	Parviz Hassanzadeh	1763	

-- The MAILING DATE of this communicati n appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) *21-32* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-32* are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 July 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-20, drawn to apparatus, classified in class 156, subclass 345.38.

II. Claims 21-32, drawn to method, classified in class 438, subclass 710+.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the method could be used using an apparatus not requiring a plasma tube (remote plasma source) rather having a primary plasma source chamber arranged on a process chamber.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Robert R. Hagerty on 4/14/03 a provisional election was made with traverse to prosecute the invention of Group I (apparatus), claims 1-20. Affirmation of this election must be made by applicant in replying to this Office action. Claims 21-32 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

The disclosure is objected to because of the following informalities: on page 9, line 10, it is suggested to delete "87" and substitute therefor "82" in accord with drawing and citation on page 9, line 8.

Appropriate correction is required.

Drawings

The drawings are objected to under 37 CFR 1.83(a) because Fig. 7 fails to show "impingement disk 110" as described in the specification; also see Fig. 5 where the impingement disk is shown but labeled. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6, 8, 9, 11-13, 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janos (US Patent No. 5,980,638) in view of Shang et al (US Patent No. 6,182,603 B1).

Janos discloses a system (Fig. 1) for plasma processing a wafer 7 (*workpiece*), the system comprising;

a microwave power source 3 (*a power generator for exciting a gas into a plasma*);

a *process chamber* 5 for processing the workpiece 7 placed therein;

a plasma conduit 4 (*tube*) for delivering plasma exhaust from the plasma tube into the process chamber;

an upper baffle plate 6a (*baffle plate assembly, disposed between the plasma tube 4 and the workpiece 7, in the plasma chamber 5*); and

a lower baffle plate 6b (*isolation means for shielding the workpiece from electric field potentials in a sheath created by activation of a supplemental ion source*) (column 1, line 42 through column 2, line 30).

Janos fails to teach a supplemental ion source, located proximate the process chamber; the supplemental ion source, when activated, thereby enhancing the ion current of the plasma exhaust.

Shang et al teach a plasma processing apparatus (Fig. 1) including a remote plasma chamber 66 for providing radical ions into a showerhead 16, wherein an RF power source 36 is coupled to the showerhead 16 serving also as a plasma generating electrode (column 4, lines 15-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the RF plasma source as taught by Shang et al in the apparatus of Janos in order to produce plasma from gases entering the processing chamber.

Further regarding claim 3: the apparatus of Janos further includes quartz standoffs 8 for supporting the wafer 7 (*workpiece is mounted upon pins located within the process chamber*).

Further regarding claims 4-6, 11-13: The showerhead electrode of Shang is made of a conductive material such as aluminum or anodized aluminum (column 6, lines 26-67) and the showerhead may have holes in the shape of cone as shown in Figs. 2A-2B). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the shape of the showerhead openings as taught by Shang et al in the apparatus of Janos in order to further direct the flow of exiting gas from the showerhead toward the workpiece.

Further regarding claims 8, 9, 15-18: The selection of material composition among the commonly used corrosion resistance material such as quartz and anodized aluminum is considered to have been obvious to one of ordinary skill in the art at the time of the invention and thus, it dose not add any new structural element to the apparatus. Arrangement of the of the holes in the baffle plates for controlling the extend of radial ions (off-alignment) to charges ions (alignment) is also considered to have been obvious to one of ordinary skill in the art at the time of invention.

Claims 7, 14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janos (US Patent No. 5,980,638) in view of Shang et al (US Patent No. 6,182,603 B1) as applied to claims 1-6, 8, 9, 11-13, 15-18 above, and further in view of Fujikawa et al (US Patent No. 5,595,606).

Janos in view of Shang et al teach all limitations of the claims as discussed above except for liquid cooling channels running through the lower baffle plate.

Fujikawa et al teach a showerhead (Fig. 6) including a passage 84 provided in a lower block 62 of the showerhead so that a coolant such as water would flow therethrough for removing heat from the bottom block of the showerhead (column 6, line 54 through column 7, line 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the cooling passage as taught by Fujikawa et al in the apparatus of Janos in view of Shang et al in order to remove heat from the lower baffle plate.

Claims 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janos (US Patent No. 5,980,638) in view of Shang et al (US Patent No. 6,182,603 B1) as

applied to claims 1-6, 8, 9, 11-13, 15-18 above, and further in view of Lee et al (US Patent No. 5,968,275).

Janos in view of Shang et al teach all limitations of the claims as discussed above except for an impingement disk disposed atop the upper baffle plate for allowing a plasma discharge to impinge thereupon and be directed through the plurality of holes.

Lee et al disclose a plasma processing apparatus (Fig. 1) including a deflector plate 104 for blocking radiation due to plasma (column 1, line 41-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the deflector plate as taught by Lee et al in the apparatus of Janos in view of Shang et al in order to block radiation due to plasma which also would block plasma species directed thereto. According to *in re Kronig, 539 F.2d 1300, 190 USPQ 425 (CCPA 1976)* a combination rejection is not deficient merely because Applicants allege a different advantage than that taught by the reference.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Barnes et al (US Patent No. 6,239,553 B1) teach a plasma processing apparatus (Fig. 4) including a remote plasma source and an inductive plasma source disposed on a processing chamber;

Srivastava (US Patent No. 6,225,745 B1) disclose a plasma processing apparatus (Fig. 1a) including a baffle assembly disposed between a remote plasma discharge tube and workpiece;

Shang et al (US Patent No. 5,788,778) teach a plasma processing apparatus (Fig. 1) including a remote plasma source and an additional RF plasma source disposed between a gas distribution baffle and a workpiece;

Sun et al (US Patent No. 6,432,255 B1) teach a plasma processing apparatus (Fig. 1) including a remote plasma source and an additional RF plasma source disposed between a gas distribution baffle and a workpiece;

Oda et al (US Patent No. 5,010,842) teach a plasma reactor (Fig. 3) comprising a gas distribution means 30 including *quartz* plates 13a, 13b each provided with a multiplicity of ports 14;

Kitagawa (US Patent No. 6,127,703 B1) teach a plasma reactor including a *cooled* plate 106 having a plurality of holes;

Kitagawa (US Patent No. 6,217,704 B1) teach a plasma reactor including two plasma source; and

Kamarehi et al (US Patent No. 6,412,438 B2) teach a plasma reactor (Fig. 15) including two baffle plates 151, 155.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (703)308-2050. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703)308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9310 for regular communications and (703)872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

P. Hassanzadeh

Parviz Hassanzadeh
Examiner
Art Unit 1763

March 17, 2003